Problem V. — Assuming the same conditions as in problem IV, prove that in any two points of an elliptic orbit, the resistance will vary directly as the distance to the upper focus, and inversely as the fifth power of the square root of the distance to the lower focus.

Problem VI.—If the two forces are equal in circular orbits; and if a is equal to the semi-major axis of the earth's orbit; and v, g and r are respectively equal to the orbital velocity, intensity of the orbital force of gravity, and the etherial resistance of the earth at its mean distance from the sun; and if $a' =$ the semi-major axis, and $b' =$ the semi-minor axis of any elliptic orbit,—prove that one of the values of x, in the equation,

$$x^3 - 4a'x^2 + 4a'^2x - v^2g^2b'^2a'^2 \div r^2 = 0,$$

will be equal to the length of the radius vector to that point in the ellipse, where the accelerating force will be exactly balanced by the resisting force.

Note by Prof. M. C. Stevens.—In the article on Repetends published in Nos. 1 and 2 of Vol. I, it is stated, p. 25, lines 7 to 10, that "the operation may be very much abbreviated by taking advantage of the well-known property of repetends, that after one half of the figures are obtained, the second half may be found by subtracting each figure of the first half successively from 9;" and in demonstrating this property, on p. 27, it is assumed, if $1 \div d$ be a fraction that reduces to a repetend, that in the reduction by division there will occur the remainder $d - 1$.

It should have been stated that this property applies only to such fractions reducing to pure repetends as have for denominators *prime numbers.*

It is therefore evident that the property is not applicable to the repetends resulting from $\frac{1}{27}$, $\frac{1}{63}$, $\frac{1}{81}$, &c.

The restriction is implied in the proof, since the remainder $d - 1$ only occurs in case the denominator is a prime number.

Note by the Editor. — The solution of problem 105, given at p. 127, is defective, because the conclusion is virtually assumed by placing $q - p = m - A + B - C + D -$ &c. If we write instead, $p - q = -m + A - B + C - D$ &c., we shall prove, in a similar manner, that $p > q$.

We subjoin Dr. Nelson's solution of 105, which is entirely rigorous.

"The number of odd selections (1 at a time, 3 at a time, &c.) out of n shot

$$= S = n + \frac{n(n-1)(n-2)}{3!} + \frac{n(n-1)(n-2)(n-3)(n-4)}{5!} + \text{\&c.}$$

The number of even selections (2 at a time, 4 at a time, &c.)

$$=S'=\frac{n(n-1)}{2\,!}+\frac{n(n-1)(n-2)(n-3)}{4\,!}+\text{\&c.}\quad \text{Now } (1-1)^n=0$$

$$=1-n+\frac{n(n-1)}{2\,!}-\frac{n(n-1)(n-2)}{3\,!}+\frac{n(n-1)(n-2)(n-3)}{4\,!}-\text{\&c.}$$

The sum of the negative terms in this series $= S$, and the sum of the positive terms $= S'+1$. Hence $S = S' + 1$, or $S - S' = 1$. That is, the possible odd selections exceed the possible even selections, and therefore the chances are in favor of drawing an odd number."

SOLUTION OF PROBLEMS IN NUMBER FIVE.

SOLUTIONS of problems in number five have been received as follows:

From R. J. Adcock, 136; Marcus Baker, 125, 126, 127, 130 and 133; Henry Gunder, 125, 126, 127, 128, 130, 133 and 136; William Hoover, 125, 126, 130, 133 and 136; Henry Heaton, 125, 128 and 135; Christine Ladd, 129; Prof. H. T. J. Ludwick, 130, 135 and 136; Artemas Martin, 125, 133, 134 and 136; D. J. Mc. Adam, 125, 130 and 133; E. B. Seitz, 125, 127, 129, 130, 133, 134, 135 and 136; Prof. J. Scheffer, 125, 126, 127, 128, 129, 130 and 133.

125.—"From a point E, in a square field $ABCD$, lines drawn to the corners A, B and C are found to be 50, 30 and 40 rods, respectively. Required the side of the field."

SOLUTION BY E. B. SEITZ, GREENVILLE, OHIO.

Construct the right angled isosceles triangle BEF, making $BF = BE = b = 30$ rods; on EF construct the triangle AEF, making $AE = a = 50$ rods, and $AF = c = 40$ rods; and on AB construct the square $ABCD$, which is the square required; for we can easily prove that $EC = AF$.

Put $\angle AEF = \alpha$. Then we have $\cos\alpha = (a^2 + 2b^2 - c^2) \div (2ab\sqrt{2})$,

$$\begin{aligned} \text{and } AB &= \sqrt{[a^2+b^2-2ab\cos(\alpha+\tfrac{1}{4}\pi)]} \\ &= \tfrac{1}{2}\sqrt{[2a^2+2c^2+2\sqrt{(4a^2b^2+4b^2c^2+2a^2c^2-4b^4-a^4-c^4)}]} \\ &= 5\sqrt{(82+6\sqrt{119})} = 60.71496 \text{ rods.} \end{aligned}$$

126.—"In a plane triangle are given the vertical angle A and the bisectors β and γ of the base angles B and C; determine the triangle."